PATENT SPECIFICATION

Inventor: HENRI EMILE GALLARD

810,791

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International Classification: —**F06c.**

COMPLETE SPECIFICATION

Supporting Means for Rotary Members

We, MARSHALL RICHARDS MACHINE COMPANY LIMITED, a British Company, of Crook, Co. Durham, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The present invention relates to means for supporting a rotary member, which is at least partly of circular cross-section and which is adapted to rotate about an axis passing through the centre of said circular cross-section at right angles thereto, said axis being horizontal or inclined at a small angle (for example from 0 to 30°) to the horizontal. For the sake of simplicity in the ensuing description the term "approximately horizontal" is used to define both horizontal and a small inclination to the horizontal.

The supporting means according to the invention is particularly suitable for supporting one end of a rotating tubular housing section of the tubular stranding machine described in the Specification of our co-pending Application No. 7604/56 (Serial No. 810,792) of even date. The supporting means can, however, be employed for supporting other rotary members of the kind mentioned above.

In the supporting of rotary members of the kind mentioned above it is known to employ a pair of rotatable supporting rollers arranged to bear against the underside of the part of circular cross-section of the member, the axes of rotation of the rollers being substantially parallel to the approximately horizontal longitudinal axis of the part of circular cross-section. In such an arrangement it is customary to arrange the two supporting rollers on opposite sides of, and equidistant from, a vertical plane passing through said longitudinal axis with the point of contact of each roller against the surface of the part of circular cross-section displaced about 45 degrees from the point of intersection of said vertical plane with the surface of the part of circular cross-section. In this way the rollers support the weight of the rotary member and at the same time they locate the member sideways. In order to accommodate wear of the supporting rollers and the surface of the part of circular cross-section of the rotary member the two supporting members are made adjustable in the radial direction of the part of circular cross-section.

Owing to the angular positioning of the two supporting rollers in the above described arrangement the load on the supporting rollers in the radial direction of the parts of circular cross-section of the rotary member is considerably greater than would be the case if the rollers were arranged directly underneath the part of circular cross-section. Consequently more frequent inspection and maintenance of the supporting rollers is required than would be the case if the rollers were mounted directly underneath the part of circular cross-section. Again, accurate adjustment of the position of the supported end of the rotary member is difficult, since adjustment of the position of a roller to vary the vertical position of the member also results in a sideways displacement of the member.

The object of the present invention is to provide improved means for supporting a rotary member of the kind mentioned above.

According to the invention means for supporting a rotary member which is at least partly of circular cross-section and is adapted to rotate about an approximately horizontal axis passing through the centre of said circular cross section at right angles thereto comprises two inner rollers and two outer rollers bearing against said part of circular cross-section at points disposed within that half of the surface of said part which at any instant is lowermost, said rollers being adapted to rotate about axes lying substantially parallel to the approximately horizontal axis of said part, one inner roller and one outer roller being disposed on each side of a vertical plane passing through said approximately horizontal axis, each inner

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Price 25p

roller being mounted in a separate supporting arm and being arranged to bear against said part at a point close to said vertical plane and each outer roller being arranged to bear against said part at a point more remote from said vertical plane, each of said supporting arms being mounted for pivotal movement about a separate axis lying substantially parallel to said approximately horizontal axis, the pivoting axis of each arm being coincident with, or lying close to, the axis of rotation of the outer roller lying adjacent to the inner roller supported by the arm, spring means being provided to urge the arms in a direction causing the inner rollers to bear against said part.

The rollers may be mounted for rotation in the same fixed plane, or each roller may be mounted for rotation in a fixed plane different from the plane of rotation of the other rollers. In these cases the surface of each roller is made convex so that the rollers will still bear against the surface of said part if the inclination of its axis varies slightly from time to time.

We prefer, however, to mount each roller on a self-aligning bearing so that if the inclination of the axis of said part varies from time to time the inclinations of the axes of rotation of the rollers are adjusted automatically to suit the inclination of the axis of said part. In this case the surface of the rollers and the surface of said part can all be cylindrical.

The spring means acting upon said supporting arms preferably is so dimensioned that the inner rollers support the majority of the load, preferably at least 75% of the load. The spring means preferably is adjustable so that the proportion of the load carried by the inner rollers can be adjusted as desired. By making the inner rollers carry the great majority of the load the amount of wear of the outer rollers can be reduced to negligible proportions. As the inner rollers wear the spring means keeps them in contact with the rotary member.

One form of supporting means in accordance with the invention for supporting one end of a tubular housing section of a tubular stranding machine of the kind described in the Specification of Application No. 7604/56 (Serial No. 810,792) will now be described, by way of example, with reference to the accompanying drawings, in which:—

Figure 1 is a partly sectioned schematic end view of the tubular housing section and its supporting means; and

Figures 2 to 4 are sections, on an enlarged scale, along the lines II—II, III—III and IV—IV, respectively, of Figure 1.

Referring to the drawings, the tubular housing section 1 is supported for rotation by a supporting means mounted in a housing 2. The supporting means comprises two outer rollers 3 and two inner rollers 4 all having cylindrical peripheral surfaces. In the drawings the rollers 3 and 4 are shown as having the same diameter, but this need not be the case. The rollers are arranged to bear against a cylindrical roller track 5 welded to the tubular housing section 1, with the axes of rotation of the rollers arranged substantially parallel to the axis of rotation of the tubular housing section. The two inner rollers 4 bear against the roller track 5 at points A, B lying on opposite sides of, and substantially equidistant from the vertical plane C—C passing through the axis of rotation D of the roller track. In the example illustrated the angle ADB is about 32°. The two outer rollers bear against the roller track 5 at points E, F lying on opposite sides of, and substantially equidistant from, the vertical plane C—C. In the example illustrated the angle EDF is about 120°.

The two outer rollers 3 are each mounted on the central portion 6 of a shaft 7 by means of a self-aligning bearing 8. The end portions 9, 10 of each shaft 7 are received in the walls 11, 12, respectively, of the housing 2. A supporting arm 13 is pivotally mounted on each shaft 7. To this end each supporting arm comprises apertured bosses 14, 15 adapted to receive respectively a cylindrical portion 16 of the shaft 7 and a sleeve 17 mounted on a cylindrical portion 18 of the shaft 7. The portions 6, 16 and 18 of the shaft 7 are coaxial whilst the portions 9 and 10 are eccentric. In use of the apparatus each shaft 7 is clamped against rotation by means of a nut 19 on the threaded end 20 of the shaft. By slackening the nuts 19, however, it is possible to rotate each shaft 7 so that the position of the outer rollers 3 relative to the track 5 may be adjusted. Channels 21 and 22 are drilled in each shaft 7 for the purpose of lubricating the bearings 8.

The arms 13 are each curved and terminate adjacent to one another underneath the tubular housing section 1. Near its free end each arm 13 carries one of the inner rollers 4, each inner roller 4 being mounted on a self-aligning bearing 23 secured to a shaft 24. Each shaft 24 is mounted in bosses 25, 26 provided in its associated arm 13 and is secured in position by means of a grub screw 27. Channels 28, 29 are drilled in each shaft 24 for the purpose of lubricating the bearings 23.

The shafts 7 and 24 of all four rollers 3, 4 are arranged parallel to one another and substantially parallel to the axis of rotation of the roller track 5. Each of the rollers preferably comprises an annular disc 30 of synthetic resin material clamped between annular metallic discs 31. A suitable material for the discs 30 is that known under the Registered Trade Mark "Tufnol".

A rod 32 secured to the lower end of one of the arms 13 passes through a hole 33 in the adjacent end of the other arm 13 and a helical spring 34 mounted on the rod urges the lower ends of the two arms towards each other. This has the effect of pivoting the arms 13 on the

shafts 7 in a direction to cause the inner rollers 4 to bear against the roller track 5. The tension of the spring 34 may be adjusted by means of a nut 35 mounted on the threaded end 36 of the rod 32 so that the inner rollers 4 can be made to bear the desired proportion of the load of the tubular housing section. Adjustment of nut 35 may be effected through an aperture 37 in the wall 38 of the housing 2.

In order to prevent pivoting of the rollers 3, 4 on their self-aligning bearings 8 and 23, respectively, about axes lying in the radial direction of the roller track 5 and passing through the bearings, there are provided two additional cylindrical rollers 39, one arranged on each side of the vertical plane C—C. Each of the rollers 39 is mounted for rotation on either rigid or self-aligning bearings 40 on a shaft 41 and is urged by suitable spring means against the peripheral surfaces of an outer roller 3 and its adjacent inner roller 4. In the embodiment illustrated two rods 42 pass through the shaft 41 of one roller and are secured to the shaft 41 of the other roller. A spring 43 (indicated schematically in Figure 1) is mounted at the free end of each rod 42 to urge the shafts 41 towards one another. This has the effect of urging the two rollers 39 against the peripheral surfaces of the rollers 3, 4 to prevent the above-mentioned pivoting movement of the latter rollers. The tension of the springs 43 may be adjusted by means of a nut 44 on the threaded end 45 of each rod 42. The adjustment of the nuts 44 may be effected through the aperture 37. The rollers 39 may be made of aluminium.

If desired a further roller (not shown) may be arranged in the housing to engage the roller track 5 at its highest point. The purpose of this further roller is to prevent the tubular housing section 1 from jumping upwards away from the rollers 3 and 4. A further roller of this kind is shown in the drawing accompanying the Complete Specification of our co-pending Application No. 7604/56 (Serial No. 810,792).

From the above description it will be appreciated that the two outer rollers 3 and the two inner rollers 4 will bear firmly on the roller track 5 as the tubular housing section 1 rotates and that this condition will be maintained even if the longitudinal axis of the tubular housing section varies slightly from time to time, by tilting of the rollers 3, 4 on their self-aligning bearings. By suitable adjustment of the tension of the spring 34 it is possible to arrange for the inner rollers 4 to support the great majority of the load of the tubular housing section. As a result the outer rollers 3 will be subjected to negligible wear, and wear of the inner rollers 4 will be taken up automatically by the spring 34 moving the lower ends of the arms 13 towards one another. As a result inspection and maintenance of the supporting means is reduced to a minimum.

Covers (not shown) may be mounted over the apertures 37, 46 in the side walls 38, 47, respectively, of the housing 2, in order to prevent entry of dirt into the mechanism. Felt strips 48 mounted in suitable supporting members 49 seal the gaps between the walls 11, 12 and the tubular housing section 1 to prevent entry of dust at these points.

In a modified form of the apparatus shown in the drawings the bearings 8 and 23 of the rollers 3 and 4, respectively, may be rigid bearings instead of self-aligning bearings. In this case the rollers 3 and 4 preferably have convex peripheral surfaces so that the rollers will still bear against the track 5 if the inclination of the axis of the housing varies slightly from time to time.

WHAT WE CLAIM IS:—

1. Means for supporting a rotary member which is at least partly of circular cross-section and is adapted to rotate about an approximately horizontal axis passing through the centre of said circular cross-section at right angles thereto, comprising two inner rollers and two outer rollers bearing against said part of circular cross-section at points disposed within that half of the surface of said part which at any instant is lowermost, said rollers being adapted to rotate about axes lying substantially parallel to the approximately horizontal axis of said part, one inner roller and one outer roller being disposed on each side of a vertical plane passing through said approximately horizontal axis, each inner roller being mounted in a separate supporting arm and being arranged to bear against said part at a point close to said vertical plane and each outer roller being arranged to bear against said part at a point more remote from said vertical plane, each of said supporting arms being mounted for pivotal movement about a separate axis lying substantially parallel to said approximately horizontal axis, the pivoting axis of each arm being coincident with, or lying close to, the axis of rotation of the outer roller lying adjacent to the inner roller supported by the arm, spring means being provided to urge the arms in a direction causing the inner rollers to bear against said part.

2. Means according to Claim 1, in which the outer rollers are mounted on shafts supported at their ends in a housing.

3. Means according to Claim 2, in which the end portions of each shaft are eccentric with respect to the portion of the shaft on which the outer roller is mounted.

4. Means according to Claim 2 or Claim 3, in which each supporting arm is pivotally mounted on a different one of said shafts.

5. Means according to any of Claims 1 to 4, in which each inner roller is mounted for rotation on a shaft fixed relative to its supporting arm.

6. Means according to Claim 5, in which

each inner roller is mounted on its shaft by means of a self-aligning bearing.

7. Means according to Claim 2, in which each outer roller is mounted on its shaft by means of a self-aligning bearing.

8. Means according to Claims 6 and 7, in which the inner and outer rollers and the part of circular cross-section all have cylindrical surfaces.

9. Means according to Claim 8, comprising an additional roller having a cylindrical surface associated with each outer roller, each additional roller being urged by additional spring means against its associated outer roller and the adjacent inner roller.

10. Means according to Claim 9, comprising a common spring means for the two additional rollers.

11. Means according to Claim 5, in which each inner roller is mounted on its shaft by means of a rigid bearing.

12. Means according to Claim 2, in which each outer roller is mounted on its shaft by means of a rigid bearing.

13. Means according to Claims 11 and 12, in which each of the inner and outer rollers has a convex peripheral surface.

14. Means according to Claim 1, in which the tension of said spring means is adjustable.

15. Means according to Claim 9, in which the tension of said additional spring means is adjustable.

16. Means for supporting a rotary member constructed and arranged substantially as herein described and as shown in the accompanying drawing.

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Chartered Patent Agents.

PROVISIONAL SPECIFICATION

Supporting Means for Rotary Members

We, MARSHALL RICHARDS MACHINE COMPANY LIMITED, a British Company, of Crook, Co. Durham, do hereby declare this invention to be described in the following statement:—

The present invention relates to means for supporting a rotary member which is at least partly of circular cross-section and which is adapted to rotate about an axis passing through the centre of said circular cross-section at right angles thereto, said axis being horizontal or inclined at a small angle (for example from 0 to 30 degrees) to the horizontal. For the sake of simplicity in the ensuing description the term "approximately horizontal" is used to define both horizontal and a small inclination to the horizontal.

The supporting means according to the invention is particularly suitable for supporting one end of a rotating tubular housing section of the tubular stranding machine described in the Specification of our co-pending Application No. 7604/56 (Serial No. 810,792) of even date. The supporting means can, however, be employed for supporting other rotary members of the kind mentioned above.

In the supporting of rotary members of the kind mentioned above it is known to employ a pair of rotatable supporting rollers arranged to bear against the underside of a cylindrical part of the member, the axes of rotation of the rollers being substantially parallel to the approximately horizontal longitudinal axis of said cylindrical part. In such an arrangement it is customary to arrange one supporting roller on each side of a vertical plane passing through the longitudinal axis of the cylindrical part with each roller bearing against the surface of the cylindrical part at a point displaced about 45 degrees from said vertical plane. In this way the rollers support the weight of the rotary member and at the same time they locate the member sideways. In order to accommodate wear of the supporting rollers and the surface of the cylindrical part of the rotary member the two supporting members are made adjustable in the radial direction of the cylindrical part.

Owing to the angular positioning of the two supporting rollers in the above described arrangement the load on the supporting rollers in the radial direction of the cylindrical part of the rotary member is considerably greater than would be the case if the rollers were arranged directly underneath the cylindrical part. Consequently more frequent inspection and maintenance of the supporting rollers is required than would be the case if the rollers were mounted directly underneath the cylindrical part. Again, accurate adjustment of the position of the supported end of the rotary member is difficult, since adjustment of the position of a roller to vary the vertical position of the member also results in a sideways displacement of the member.

The object of the present invention is to provide improved means for supporting a rotary member of the kind mentioned above.

According to the invention means for supporting a rotary member which is at least partly of circular cross-section and is adapted to rotate about an approximately horizontal axis passing through the centre of said circular cross-section at right angles thereto comprises two inner rollers and two outer rollers bearing against said part of circular cross-section at points disposed within that half of the surface of said part which at any instant is lowermost, said rollers being adapted to rotate about axes lying substantially parallel to the approximately horizontal axis of said part, one inner roller and one outer roller being disposed on each side of a vertical plane passing through

said approximately horizontal axis, each inner roller being mounted in a separate supporting arm and being arranged to bear against said part at a point close to said vertical plane and each outer roller being arranged to bear against said part at a point more remote from said vertical plane, each of said supporting arms being mounted for pivotal movement about a separate axis lying substantially parallel to said approximately horizontal axis, the pivoting axis of each arm being coincident with, or lying close to, the axis of rotation of the outer roller lying adjacent to the inner roller supported by the arm, spring means being provided to urge the arms in a direction causing the inner rollers to bear against said part.

The rollers may be mounted for rotation in the same fixed plane, or each roller may be mounted for rotation in a fixed plane different from the plane of rotation of the other rollers. In these cases the surface of each roller is made convex so the rollers still bear against the surface of said part if the inclination of its axis varies slightly from time to time.

We prefer, however, to mount each roller on a self-aligning bearing so that if the inclination of the axis of said part varies from time to time the inclination of the axes of rotation of the rollers automatically adjust themselves to suit the inclination of the axis of said part. In this case the surface of the rollers and the surface of said part can all be cylindrical.

The spring means acting upon the inner roller supporting arms preferably is so dimensioned that the inner rollers support the majority of the weight of the rotary member, preferably at least 75 per cent of the weight. The spring means preferably is adjustable so that the proportion of the weight carried by the inner rollers can be adjusted as desired. By making the inner rollers carry the great majority of the weight of the rotary member the amount of wear of the outer rollers can be reduced to negligible proportions. As the inner rollers wear the spring means keeps them in contact with the rotary member.

In a preferred form of supporting means in accordance with the invention for supporting one end of a tubular housing section of a tubular stranding machine of the kind described in the specification of the above mentioned co-pending application, the four rollers are of substantially the same diameter and their surfaces are cylindrical. The four rollers are arranged to bear against a cylindrical roller track secured to, or formed integral with, the tubular housing section. The two inner rollers bear against the roller track at points spaced about 16° on each side of a vertical plane passing through the axis of rotation of the roller track and the two outer rollers bear against the roller track at points spaced about 60° on each side of said vertical plane.

The two outer rollers are each mounted on a self-aligning bearing which in turn is fixed to a shaft mounted in a suitable supporting frame. These shafts preferably are carried by the supporting frame on an eccentric mounting so that wear of the outer rollers can be taken up from time to time. A separate supporting arm is pivotally mounted on each of the outer roller shafts, the said arms being curved and terminating adjacent to one another underneath the tubular housing section. Near its free end each arm carries one of said inner rollers, each inner roller being mounted on a self-aligning bearing fixed to a shaft mounted on the arm. The shafts of all four rollers are arranged parallel to one another and parallel to the longitudinal axis of the tubular housing section.

A helical spring is mounted on the free ends of the two supporting arms so that the free ends of the two arms are urged towards one another. This has the effect of pivoting the arms about said eccentrically mounted shafts in a direction to cause the inner rollers to bear against the roller track. The tension of the spring is adjustable so that the inner rollers can be made to bear the desired proportion of the load of the tubular housing section.

In order to prevent pivoting of the rollers on their self-aligning bearings about axes lying in the radial direction of the roller track and passing through the bearings we provide two additional rollers, one arranged on each side of said vertical plane. Each of these additional rollers is mounted for rotation on a fixed bearing and is urged by spring means against the peripheral surfaces of an outer roller and its adjacent inner roller. In a preferred arrangement these two additional rollers are urged into position by a common spring means.

From the above description it will be appreciated that the two inner rollers and the two outer rollers will bear firmly on the roller track as the tubular housing section rotates and that this condition will be maintained even if the inclination of the longitudinal axis of the tubular housing section varies slightly from time to time by tilting of the rollers on their self-aligning bearings. By suitable adjustment of the tension of the helical spring it is possible to arrange for the inner rollers to support the great majority of the load of the tubular housing section. As a result the outer rollers will be subjected to negligible wear and wear on the inner rollers will be taken up automatically by the helical spring. As a result inspection and maintenance of the supporting means is reduced to a minimum.

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Chartered Patent Agents.

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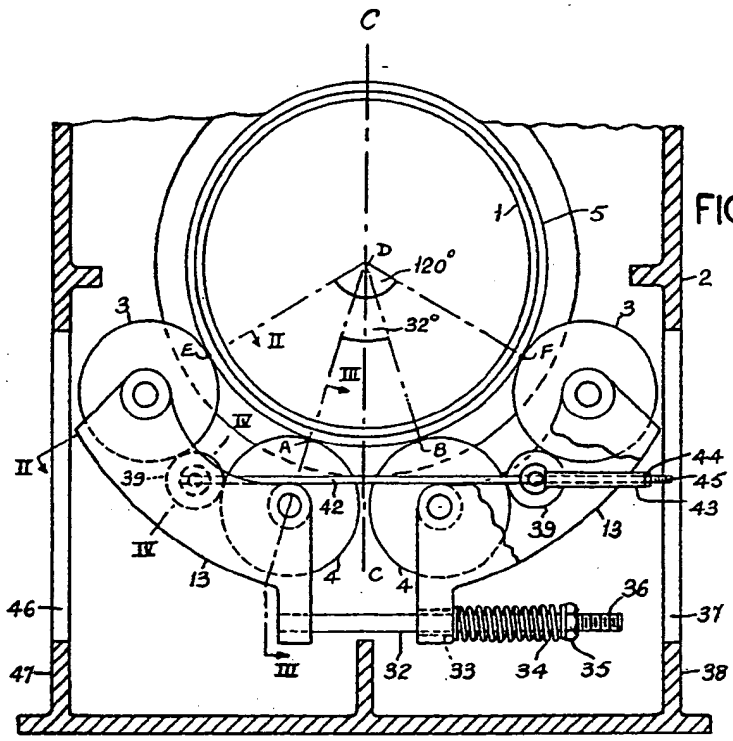
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FIG.1

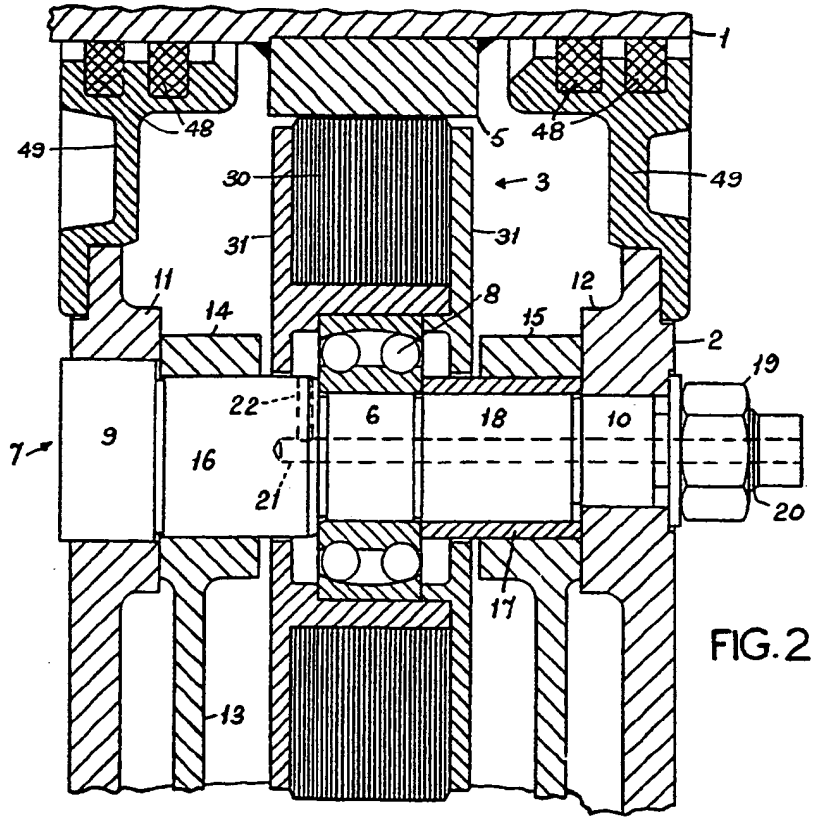
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FIG.2

810791 COMPLETE SPECIFICATION
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Sheets 1 & 2

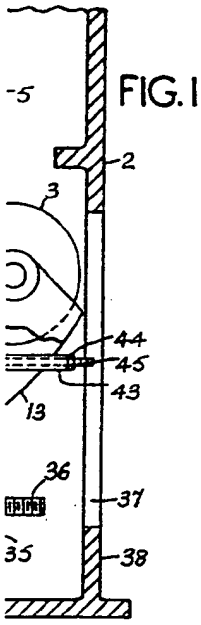


FIG.1

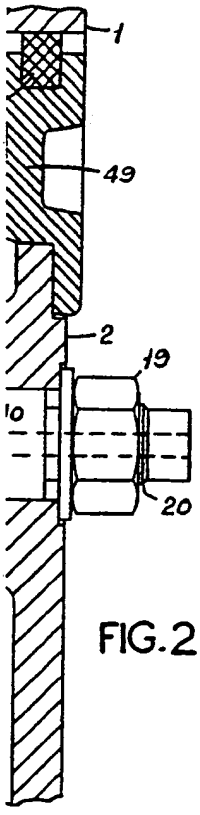
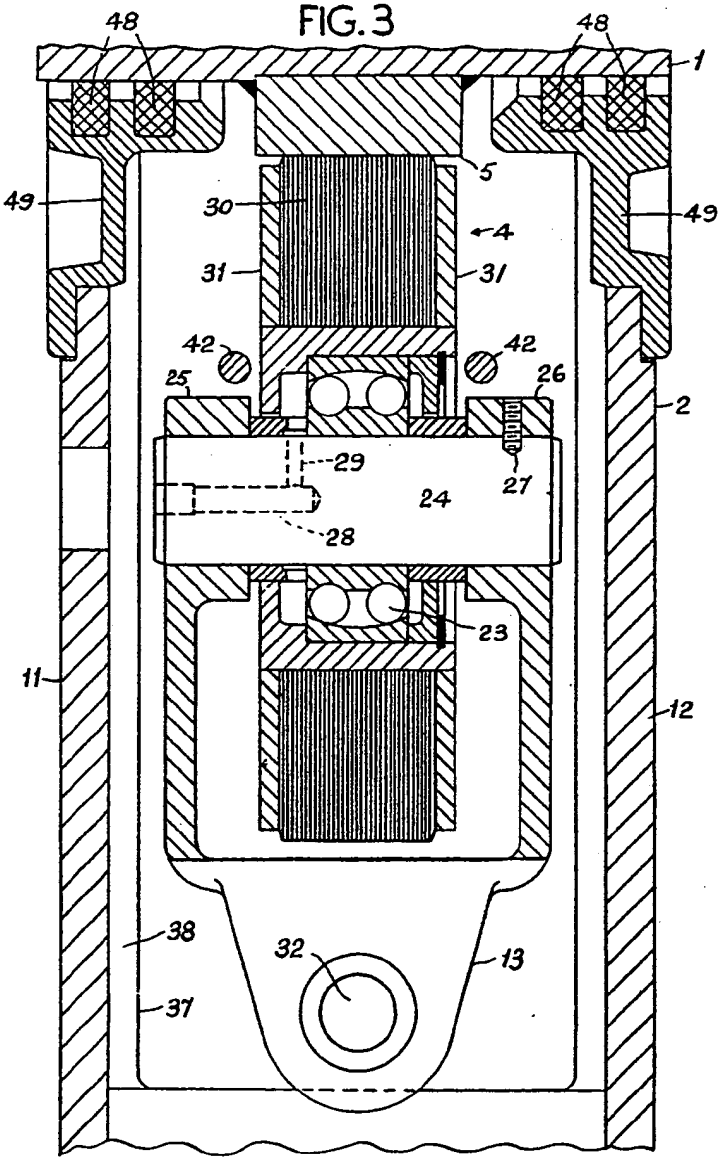


FIG.2

FIG.3



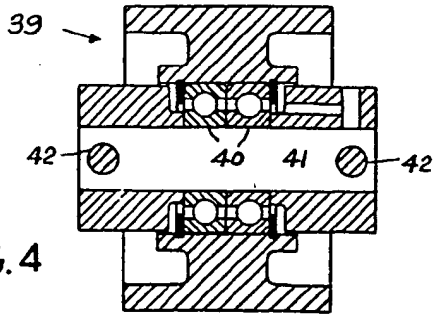


FIG.4

810791 COMPLETE SPECIFICATION
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Sheets 1 & 2

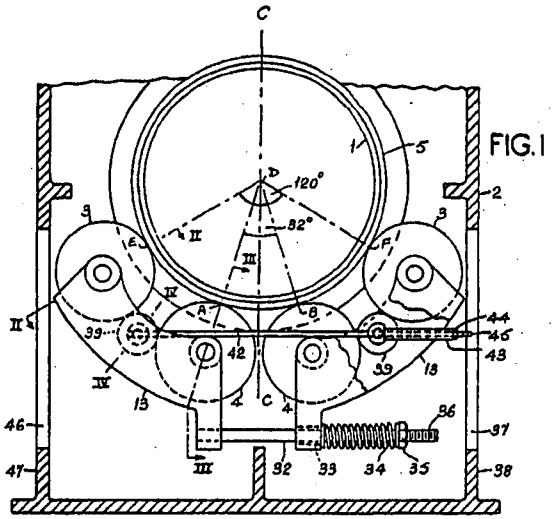


FIG.1

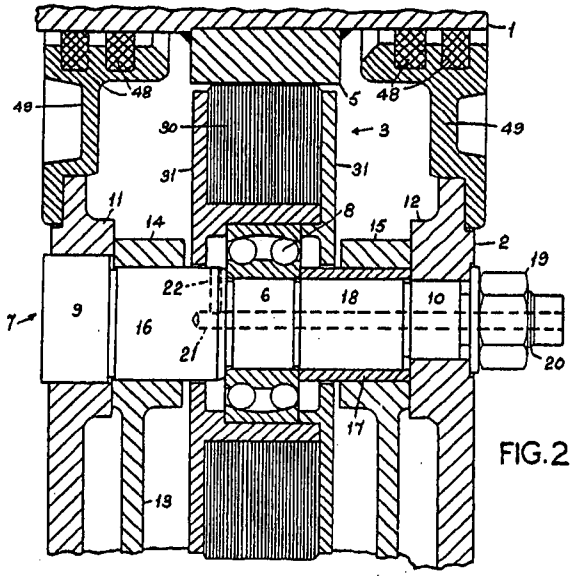
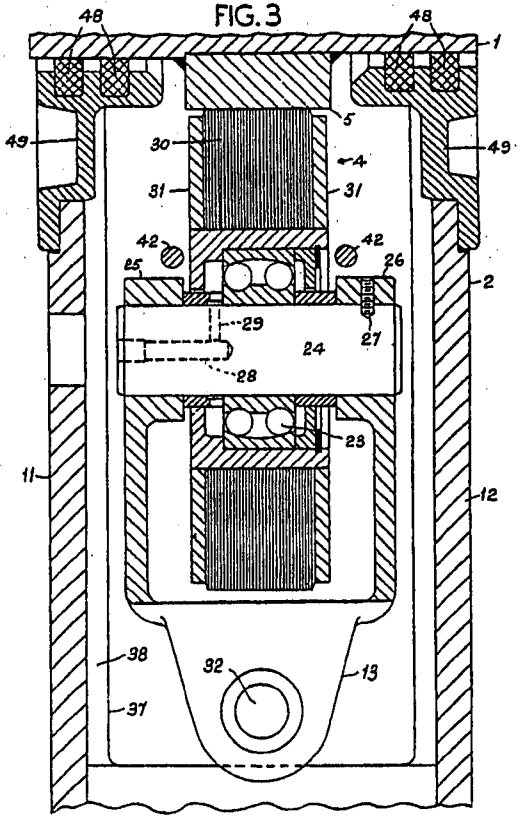


FIG.2

FIG.3



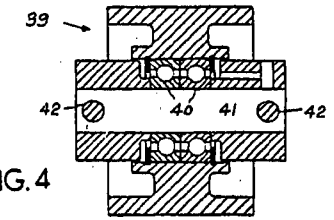


FIG.4

Aug. 6, 1935. P. A. DUBUS 2,010,752

BEARING FOR COFFEE ROASTERS

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Fig. 1.

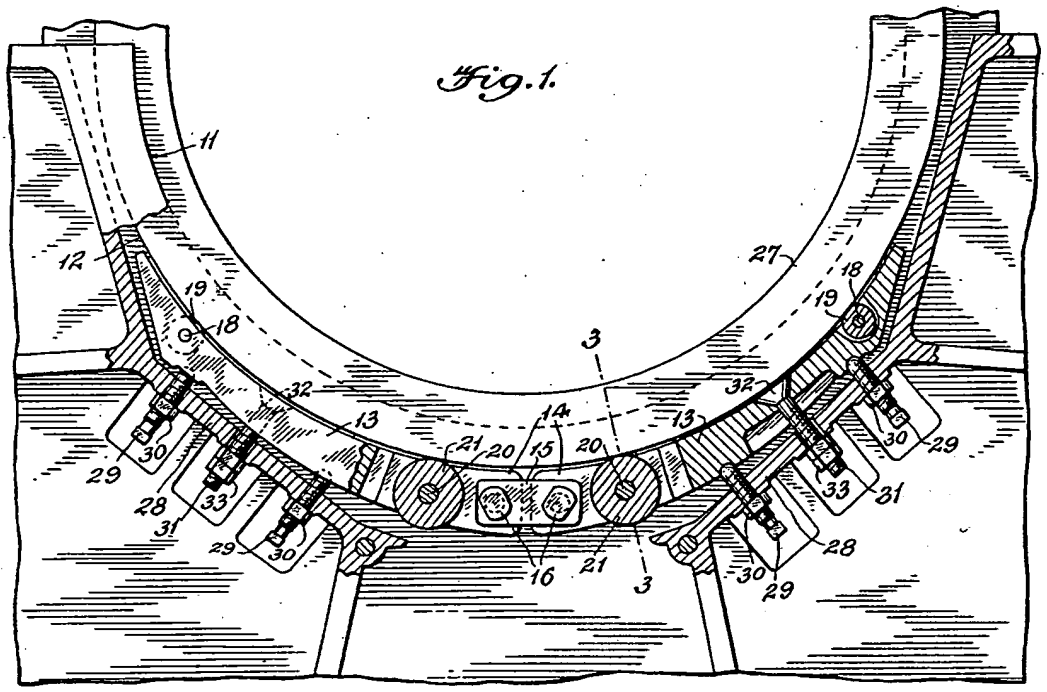


Fig. 2.

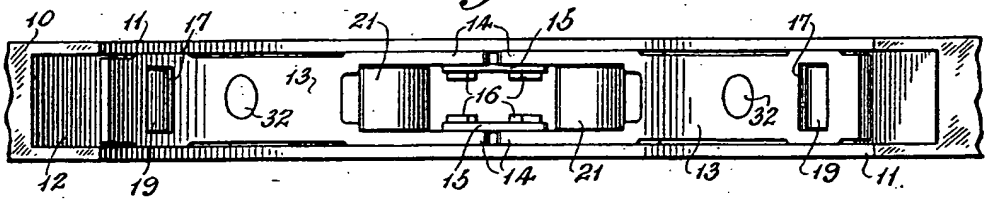


Fig. 3.

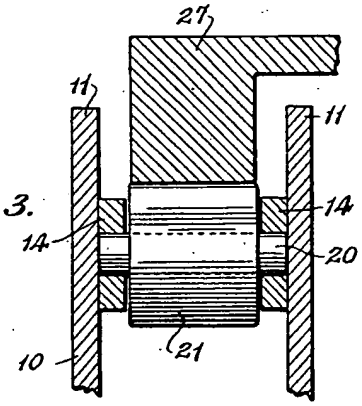
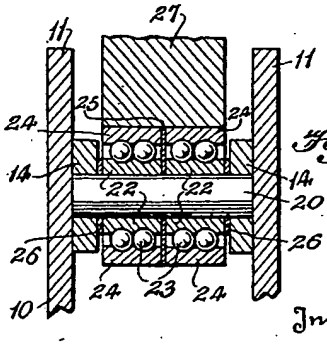


Fig. 4.



Inventor

Peter A. Dubus.

By Isaac P. Jackson,

Attorney

Aug. 6, 1935. P. A. DUBUS 2,010,752

BEARING FOR COFFEE ROASTERS

Filed April 8, 1935 2 Sheets-Sheet 2

FIG. 5.

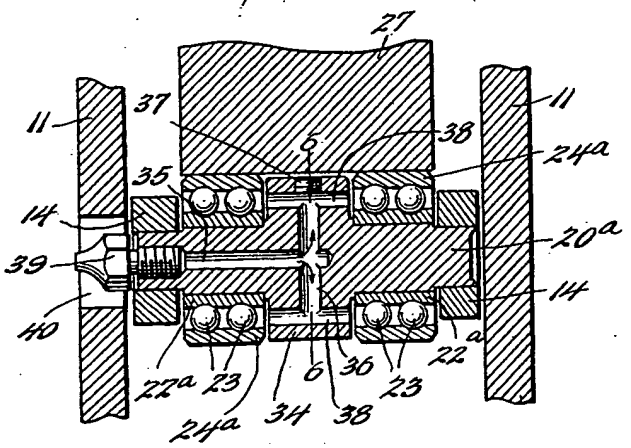


FIG. 6.

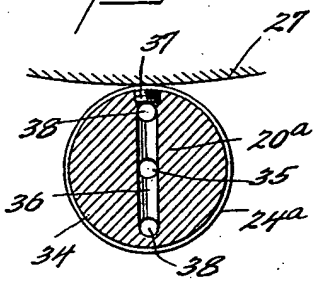


FIG. 7.

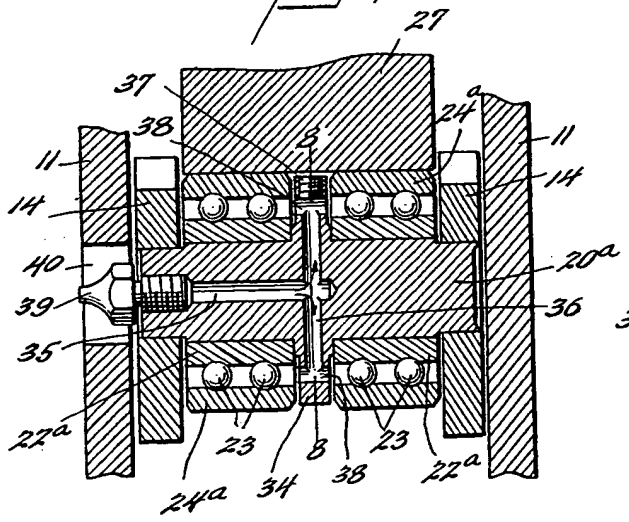
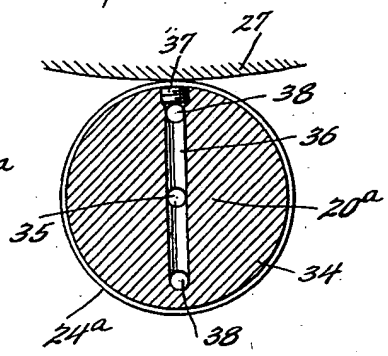


FIG. 8.



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